

REMARKS

Applicants have carefully considered this Application in connection with the Examiner's Action, and respectfully request reconsideration of this Application in view of the above Amendment and the following remarks.

Pending in the application are Claims 1 – 99.

I. Objection to the Drawings

Applicants have amended paragraphs 25, 27, 32, and 45 to remove the number “222,” which was inadvertently included as a reference to the “distribution-blending area.” The distribution-blending area is fully described in the specification as the area where the acid and base sprayers mix above the distribution-blending-cooling dish. See, Specification, Paragraph 25.

II. Objections to the Specification

Applicants have amended paragraphs 2 and 6 to correct the grammatical errors noted by the Examiner.

III. Objections to the Claims

Applicants have amended Claims 7 – 9, 11, 12, 16, 17, 41, 43, 47, 52, 54, 56, 59, 60, 61, 68 – 70, 72, 77, 78, 86 – 88, 90, and 94 – 99 to correct the informalities noted by the Examiner.

IV. Rejections Under 35 U.S.C. §112

A. Claims 2 – 5 and 63 – 66

Applicants respectfully assert that these claims are not indefinite. Although the claims refer to functional limitations and not structural limitations, functional language does not render a claim indefinite so long as a person of ordinary skill in the art would understand the limitation. See MPEP §2173.05(g). Applicants respectfully assert that even if functional limitations are not given patentable

weight over prior art in an apparatus claim, this has no bearing on whether the claim language is definite. As stated in MPEP §2173.05(g), the issue of whether a functional limitation complies with 35 U.S.C. §112 is a different issue from whether the limitation is distinguished over the prior art.

In this case, a person of ordinary skill in the art would clearly understand the limitations of Claims 2 – 5 and 63 – 66, which relate to the acid and base used in the apparatus. Thus, these claims are definite.

B. Claims 13 – 14 and 74 – 75

Applicants respectfully assert that the terms “adequate size,” “minimal depth,” and “broad distribution” are not indefinite. Relative terminology does not render a claim indefinite, so long as a person of ordinary skill in the art would understand what is claimed, in light of the specification. See MPEP §2173.05(b). These terms refer to the structure of the distribution-blending-cooling dish. As described in paragraph 23 of the specification, the distribution-blending-cooling dish is preferably constructed to be proportionate to the amounts of acid and base introduced to the apparatus. Thus, the shape of the distribution-blending cooling dish will vary. A person of ordinary skill in the art, relying on the specification, would understand that the size and depth of the distribution-blending-cooling dish must be chosen to allow efficient cooling and sufficient mixing, without the formation of chunks of inadequately blended material. See, Specification, Paragraph 23. A person of skill in the art will be well-equipped to do this and would thus understand the limitations of the claims. Thus, the terms used within Claims 13 – 14 and 74 – 75 do not render the claims indefinite.

C. Claims 19 – 21

Applicants respectfully assert that the reference within these claims to “in-air mixing” does not render the claims indefinite. As discussed in section IV.A. above, functional language does not make a claim indefinite so long as a person of ordinary skill in the art would understand the limitation. The concept of “in-air mixing” of the acid and the base is fully described in the specification at paragraph 15. Thus, this terminology is not indefinite.

Applicants also respectfully assert that the term “large amounts” is not indefinite because a person of ordinary skill in the art would understand the limitation. As described in paragraph 15 of the specification, the in-air mixing of the acid and base helps minimize the lumps or chunks of insoluble material that will adhere to the sides of the vessel. In-air mixing helps prevent adherence of large amounts of solid material, sufficient to prevent thorough mixture and result in a bad batch. A person of skill in the art would understand the limitation because the tendency of a mixture of acid and base to form solid material is well understood.

Thus, Claims 19 – 21 are not indefinite.

D. Claims 21 – 23 and 27 – 29

Applicants respectfully assert that the term “hard particles” is not indefinite because it defines the solid particles of un-reacted base, which are discussed at paragraph 9 of the specification. A person of ordinary skill in the art, being familiar with the process of mixing acid and base, would understand the terminology. Furthermore, Applicants respectfully assert that the term “hard” is not a relative term. The term does not relate to varying degrees of hardness of the particles, nor does the claim depend on the degree of hardness. Applicants also respectfully assert that although the reference to “hard particles” is a functional limitation within the apparatus claims, it is not indefinite because a person of ordinary skill in the art would understand what is meant by this term.

E. Claims 25 – 27

Applicants respectfully assert that, for the reasons discussed in section IV.C. above, the terms “in-air mixing” and “large amounts” do not render these claims indefinite.

F. Claim 30

Applicants respectfully assert that the term “slurry” does not render the claim indefinite. Although the term is a functional limitation, a person of ordinary skill in the art would understand the limitation. A “slurry” is clearly defined in the specification as a mixture of powdered base and water. See, Specification, Paragraph 27 and 39. Thus, the claim is not indefinite.

G. Claims 33 and 80

Applicants respectfully assert that these claims are not indefinite because the “acid reservoir cooling coil” is disclosed in the specification at paragraph 8.

H. Claims 38, 57, 82, and 96

Applicants respectfully assert that the reference to a “predetermined level” of acid or base flow is not indefinite. Functional limitations in an apparatus claim are not indefinite, so long as a person of ordinary skill would understand them. As explained in paragraphs 24 and 31 of the specification, the acid or base flow controller operates to control the rate of flow of acid or base at a level determined by the operator. This “predetermined level” of acid or base flow rate will vary. A person of ordinary skill in the art, relying on the specification, would understand what is meant by “predetermined level.” Thus, this term is not indefinite.

I. Claims 43, 45, 46, 86, 88, and 89

Applicants have amended these claims above in order to delete the term “dilute” from the claims. Applicants respectfully assert that the term “the acid” has antecedent basis.

J. Claims 46 and 89

Applicants respectfully assert that these claims are not indefinite. Functional limitations in an apparatus claim are not indefinite, so long as a person of ordinary skill would understand them. Paragraph 20 of the specification discusses generation of a vortex which assists in thermal exchange between the mixture and the walls of the chamber. A person of skill in the art would understand the terms in Claims 46 and 89 as they relate to the vortex. Furthermore, the term “can maximize” does not render these claims indefinite because a person of skill in the art, relying on the specification, would understand that thermal exchange occurs when liquid contacts a surface. A person of ordinary skill in the art would also understand that the claim is directed to creation of a vortex that produces an optimal amount of thermal exchange. Thus, Claims 46 and 89 are not indefinite.

K. Claims 47 and 90

Applicants respectfully assert that the functional language of these claims does not render them indefinite. Functional limitations in an apparatus claim are not indefinite, so long as a person of ordinary skill would understand them. A person of ordinary skill would understand the mixing of the acid and base in a thin layer on the distribution-blending-cooling dish, as well as the formation of a suspension containing insoluble particles. Thus, the language is not indefinite. Furthermore, Applicants respectfully assert that the term "hard" is not a relative term and is not indefinite. The term does not relate to varying degrees of hardness of the particles, nor does the claim depend on the degree of hardness. The term "hard particles" simply defines the solid particles of un-reacted base, which are discussed at paragraph 9 of the specification. The degree of hardness is irrelevant. Thus, the term "hard particles" is not indefinite.

L. Claims 48 and 92

Applicants respectfully assert that these claims are not indefinite for referring to "the vortex." Even if the vortex is considered a functional feature, functional limitations in an apparatus claim are not indefinite, so long as a person of ordinary skill would understand them. The term "vortex" would be fully understood by a person of ordinary skill in the art.

M. Claims 59 and 97

Applicants have amended Claims 59 and 97 to recite that the precipitate chamber is connected to the chamber. Support for this amendment may be found within paragraph 36 of the specification. Thus, the structural relationship has been established and the claims are not indefinite.

N. Claims 60 and 98

Applicants have amended Claims 60 and 98 to recite that the filter chamber is connected to the precipitate chamber of Claims 59 and 97. Support for this amendment may be found within paragraph 36 of the specification. Thus, the structural relationship has been established and the claims are not indefinite.

O. Claims 61 and 99

Applicants have amended Claims 61 and 99 to recite that the storage chamber is connected to the filter chamber of Claims 60 and 98. Support for this amendment may be found within paragraph 36 of the specification. Thus, the structural relationship has been established and the claims are not indefinite.

P. Claim 62

Applicants have amended Claim 62 to correct the typographical error in lines 14 – 15. The claim now recites “the acid delivery system,” which refers to the same acid delivery system described earlier in the claim.

Q. Claims 86 – 88

Applicants have amended these claims above. Claim 86 now recites that the acid delivery system comprises a vortex generator. Support for this amendment may be found in the specification at paragraph 9. Claims 86 – 88 have also been amended to replace the term “injectors” with the proper term, “eductors.” This terminology is defined in the specification at paragraph 25.

R. Claim 94

Applicants have amended this claim so that it correctly depends from Claim 93. Thus, the term “the base reservoir” has proper antecedent basis.

S. Claim 95

Applicants have amended this claim to correctly recite “the base flow meter” and to depend from Claim 93. Thus, the terms have proper antecedent basis.

V. Rejections Under 35 U.S.C. §103(a)

A. U.S. Patent No. 3,881,700 to Bradford

Claims 1 – 5, 13, 14, 18 – 39, 49, 50, 51 – 66, 74 – 75, 80, 83, 94, and 97 – 99 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 3,881,700 to Bradford (“Bradford”). Applicants respectfully assert that Bradford does not render the claimed subject matter obvious because Bradford does not teach or suggest all of the claim limitations. To establish the obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. *See In re Royka*, 180 U.S.P.Q. 580 (C.C.P.A. 1974). Bradford does not teach the distribution-blending-cooling dish nor the separate acid and base delivery systems of underlying Claims 1 and 63.

Bradford does not disclose, teach, or suggest a **distribution-blending-cooling dish** which allows gradual mixture of an acid and base in a thin layer. Bradford is directed to a **water treatment plant** in which soiled water is mixed with treatment chemicals. See, Bradford, Abstract. The processes involved in water treatment do not result in excess heat release and thus this technology is not comparable to Applicant’s apparatus. The cup-shaped member of Bradford is not equivalent to Applicant’s distribution-blending-cooling dish because **the cup-shaped member is shaped like a cup, which promotes turbulent mixing rather than mixing in a thin layer**. See, Bradford, Abstract. The thin layer of mixing that occurs on Applicant’s distribution-blending-cooling dish is purposefully designed to allow atom-by-atom mixing of the acid and base, in order to prevent the formation of lumps. See, Specification, Paragraph 15. Thus, a person of skill in the art would not have been motivated to create the claimed apparatus based on Bradford’s disclosed apparatus.

Furthermore, the water treatment plant of Bradford **delivers its soiled water and treatment chemicals to the chamber in a single conduit pipe**, rather than through separate acid and base delivery systems. As seen in Figure 1 of Bradford, the mixed water and chemicals enter the tank through a single conduit pipe (14), having already been mixed together at the T connection (18). Thus, **the water delivery system and the chemical delivery system of Bradford are not structurally equivalent to the acid and base delivery systems of Applicant’s apparatus**. Applicant’s acid and base delivery systems promote gradual mixing and heat release as the acid and base come into contact

with each other in small amounts within the mixing chamber. See, Specification, Paragraph 15. The uncontrolled mixing of the two fluids within the single conduit pipe of Bradford is not suitable for Applicant's apparatus, and a person of skill in the art would not have constructed Applicant's acid and base delivery systems based on what is suggested by Bradford.

For these reasons, Applicants respectfully submit that Claims 1 - 5, 13, 14, 18 - 39, 49, 50, 51 - 66, 74 - 75, 80, 83, 94, and 97 - 99 are patentable over Bradford.

B. Bradford in view of U.S. Patent No. 2,930,677 to Van Loenen

Claims 6 - 8, 15 - 17, 67 - 69, and 76 - 78 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Bradford with respect to U.S. Patent No. 2,930,677 to Van Loenen ("Van Loenen"). Applicants respectfully assert that Bradford and Van Loenen do not render the claimed subject matter obvious because Bradford and Van Loenen do not teach or suggest all of the claim limitations.

As discussed above, **Bradford does not teach the distribution-blending-cooling dish nor the separate acid and base delivery systems of underlying Claims 1 and 63.** Bradford's cup-shaped member is not structurally equivalent to Applicants' distribution-blending-cooling dish and would be inappropriate for the claimed apparatus due to its turbulent mixing. Bradford's single conduit pipe is not structurally equivalent to Applicants' separate acid and base delivery systems and would be inappropriate for the claimed apparatus due to its uncontrolled mixing outside of the mixing tank.

Furthermore, Van Loenen is directed to the use of **thermoplastic coatings within an apparatus for mixing scale forming compounds.** See, Van Loenen, Col. 3, lines 19 - 25. Scale formation is not a concern within Applicant's apparatus for mixing acid and base. In addition, Van Loenen is directed to the use of Bayer caustic aluminum liquors and not acids and bases. See, Van Loenen, Col. 1, lines 35 - 39. Thus, a person of ordinary skill in the art would not have been motivated to use the non-corrosive coating of the current claims within the claimed apparatus based on the teachings of Van Loenen.

For these reasons, Claims 6 - 8, 15 - 17, 67 - 69, and 76 - 78 are patentable over Bradford in view of Van Loenen.

C. U.S. Patent No. 5,782,556 to Chu

Claims 1 – 5, 13, 14, 18 – 32, 34 – 40, 42, 49, 50, 53 – 58, 61 – 66, 74 – 75, 83, 84, and 99 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,782,556 to Chu. Applicants respectfully assert that Chu does not render the claimed subject matter obvious because Chu does not teach or suggest all of the claim limitations. Chu does not teach the distribution-blending-cooling dish of underlying Claims 1 and 63.

Chu does not disclose, teach, or suggest a distribution-blending-cooling dish which allows gradual mixture of an acid and base in a thin layer. **Chu discloses a conical filter, not a dish.** See, Chu, Col. 2, lines 56 – 60. The conical filter of Chu is not structurally equivalent to Applicant's distribution-blending-cooling dish because **the conical filter forces the components to drain through the perforations rather than mix in a thin layer.** In addition, Chu is directed to **an apparatus for emulsifying fuel, not an apparatus for mixing acid and base.** The only structural purpose of Chu's apparatus is thoroughly mixing the components, not mixing them gradually in a thin layer on a dish in order to minimize the formation of lumps and excess heat release. Thus, a person of ordinary skill in the art would not have been motivated to construct Applicant's apparatus based on the teachings of Chu.

For these reasons, Claims 1 – 5, 13, 14, 18 – 32, 34 – 40, 42, 49, 50, 53 – 58, 61 – 66, 74 – 75, 83, 84, and 99 are patentable over Chu.

D. Chu in view of U.S. Patent No. 4,164,541 to Platz et al.

Claims 41, 43 – 48, and 85 – 92 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Chu in view of U.S. Patent No. 4,164,541 to Platz et al. ("Platz"). Applicants respectfully assert that Chu and Platz do not render the claimed subject matter obvious because Chu and Platz do not teach or suggest all of the claim limitations.

As discussed above, Chu does not disclose, teach, or suggest the distribution-blending-cooling dish of underlying Claims 1 and 63, which allows gradual mixture of an acid and base in a thin layer. **Chu discloses a conical filter, not a dish.** See, Chu, Col. 2, lines 56 – 60.

Furthermore, Platz does not disclose, teach, or suggest the eductors of the claimed apparatus. **Platz discloses venturi pumps used for making fertilizer, which are not structurally equivalent to the eductors of Applicants' apparatus.** Each of Platz's venturi pumps is composed of a reaction chamber (46), a nozzle (42), and a tube (40). See, Platz, Figure 3. The acid and base are reacted within the reaction chamber of the venturi pump, not within the mixing tank. See, Platz, Col. 4, lines 3 - 7. The heat and energy released as a result of the mixing of the acid and base result in the expulsion of the product from the reaction chamber through the tube. See, Platz, Col. 4, lines 3 - 15. Thus, Platz's venturi pumps are not eductors for generating a vortex. Rather, the reactions between acid and base occur within the reaction chambers of the venturi pumps. Platz's venturi pumps are not equivalent to the eductors of Applicants' apparatus and a person of ordinary skill would not be motivated to construct eductors based upon Platz's teachings of venturi pumps.

For these reasons, Claims 41, 43 - 48, and 85 - 92 are patentable over Chu in view of Platz.

E. GB Patent No. 2,236,694 to Balla et al.

Claims 1 - 5, 9 - 14, 62 - 66, 70 - 75, and 83 stand rejected under 35 U.S.C. §103(a) as being unpatentable over GB Patent No. 2,236,694 to Balla et al. ("Balla"). Applicants respectfully assert that Balla does not render the claimed subject matter obvious because Balla does not teach or suggest all of the claim limitations.

Balla does not disclose, teach, or suggest the distribution-blending-cooling dish of underlying Claims 1 and 63. The Examiner asserts that the "inner vessel" of Balla is equivalent to Applicants' distribution-blending-cooling dish. However, Applicants respectfully assert that Balla's apparatus contains only one vessel. The reference in Balla to the "inner vessel of the reactor 11 itself" refers merely to the only vessel in the interior of the apparatus, which is bound by a heat-transfer surface 46 on the internal side of the boundary wall. See, Balla, Figure 1 and page 4, second paragraph. Thus, there is no "inner vessel" which is distinct from the primary vessel. Balla's cooling system comprises a series of inner ducts, tubes, and inserts which allow the passage of coolants through the interior of the reactor vessel. See, Balla, Figure 1 and page 4, second and third paragraphs. This tubing system does not constitute a distribution-blending-cooling dish, although the outlines of the pipes in Figure 1 appear

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to outline separate vessels. Balla's apparatus does not possess a dish of any type suspended within the single reactor vessel.

For these reasons, Claims 1 - 5, 9 - 14, 62 - 66, 70 - 75, and 83 are patentable over Balla.

VI. Conclusion

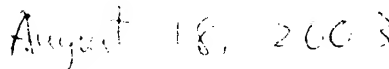
Applicants respectfully submit that, in light of the foregoing comments, Claims 1 - 99 are in condition for allowance. A Notice of Allowance is therefore requested.

If the Examiner has any other matters which pertain to this Application, the Examiner is encouraged to contact the undersigned to resolve these matters by Examiner's Amendment where possible.

Respectfully submitted,



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